

NASA TECH BRIEF

Goddard Space Flight Center



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Devolatilization of Polymer Resins

The problem:

Under conditions of high temperature and low pressure, certain substances containing polymer resins emit volatile materials, making them unsuitable for space flight use.

The solution:

A commercial silicon resin was devolatilized by vacuum distillation at 150°C for 24 hours at 1×10^{-6} Torr. The resultant product passed the test for outgassing criteria (acceptably low percentage of volatile materials), and it is cured at room-temperature.

A white paint with acceptable physical properties was made using the devolatilized resin.

How it's done:

The silicon binder, a linear polydimethylsiloxane, was heated at 150°C for 24 hours in a starting vacuum of 1×10^{-6} Torr. The resin height was one-half inch (1.25 cm).

In this particular application, a white paint (P-764-1A) was prepared using 240 parts by weight ZnO mortared with 100 parts devolatilized resin, then mechanically stirred with 200 parts reagent grade toluene and one part SRC-Q5 catalyst.

A representative sample of cured paint passed the GSFC Micro-VCM (Volatile Condensable Materials) test. The paint adhered well to primed aluminum and epoxy fiberglass surfaces, both before and after thermal cycling.

Notes:

1. The GSFC Micro-VCM Test consists of subjecting a material to 125°C at 1×10^{-6} Torr for 24 hours with the condensate being collected at 25°C in the same system. The criteria for passing the test are a maximum 1% weight loss and a maximum 0.1% of volatile condensable materials.
2. Suggested applications of the devolatilized resin are potting compounds and conformal coatings.
3. Requests for further information may be obtained from:

Technology Utilization Officer
Goddard Space Flight Center
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Reference: B72-10280

Patent status:

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